

# CLINICAL LABORATORY AUTOMATION: A COST EVALUATION

**Claudia Archetti, Alessandro Montanelli, Luigi Caimi and Emirena Garrafa**

Claudia Archetti, Dept. of Economics and Management, University of Brescia, Italy

Alessandro Montanelli, Unique Laboratory, ASST Spedali Civili, Brescia, Italy

Luigi Caimi, Dept. of Molecular and Translational Medicine, University of Brescia, Italy

Emirena Garrafa, Dept. of Molecular and Translational Medicine, University of Brescia, Italy

## Introduction

We analyse the introduction of a unique automated laboratory in the “Spedali Civili di Brescia”. The aim of the study is to emphasize the impact of the strategy adopted by the management, which is to re-use the equipment available in the existing laboratories and converge it into the new laboratory, called Core-Lab. The goal of this strategy was to contain as much as possible the costs due to the change towards the new laboratory. We thus focus our analysis on the economic impact of the introduction of the Core-Lab.

The aim of our study is to perform a cost evaluation of the introduction of Core-Lab comparing the costs between the pre-automation situation and the new setting. The study considers equipment and staff costs. The results of the analysis are then contextualized in the reality of Italian laboratories.

## Method

We consider the costs charged to the cost centre corresponding to the Core-Lab, both direct and indirect. As far as direct costs, we consider two terms: equipment and staff costs. In addition, we compare the pre-Core-Lab and the Core-Lab situation with the one of a set of Italian laboratories using the e-Valuate software provided by Gene.sys ([www.gene-sys.it](http://www.gene-sys.it)).

## Results and Discussion

We start our analysis by presenting a comparison of equipment availability and costs, followed by the analysis of the staff component and the comparison of total cost. Finally, we present a plot of the pre-Core-Lab and Core-Lab situation with respect to a set of other Italian laboratories.

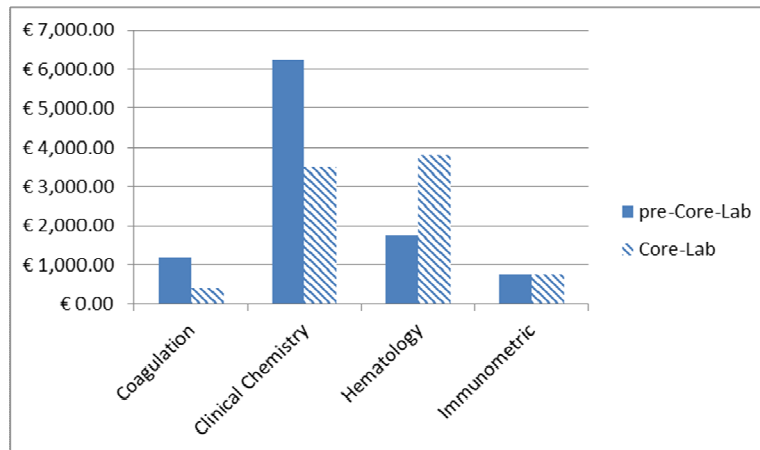


Figure 1: Comparison of equipment cost: absolute values

A better evaluation of how the equipment cost is spread among the different areas involved in the Core-Lab is provided in Figure 2.

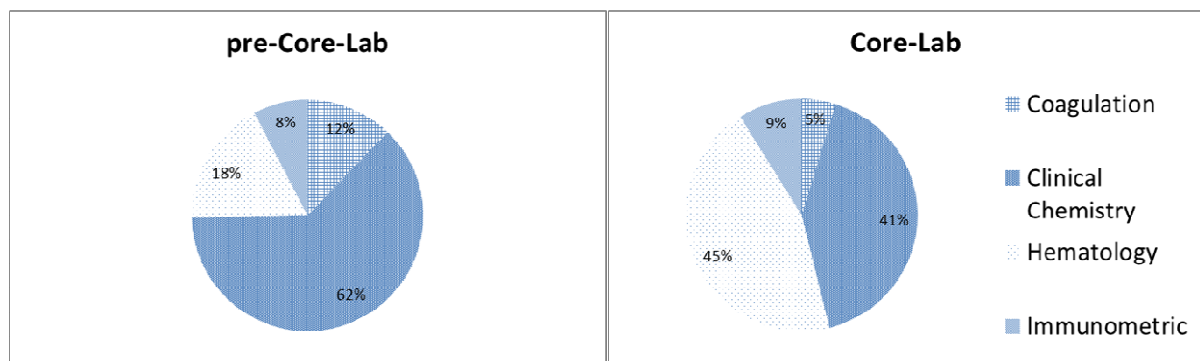


Figure 2: Comparison of equipment cost: percentages with respect to total equipment cost

When moving to the comparison in terms of staff involvement, we obtain the situation depicted in Table 1. From Table 1 we observe a reduction in total staff cost of €51,681.07, which corresponds to 14.64% of the staff cost of the pre-Core-Lab situation. We also recall that the Core-Lab offers a 24h service and the reduction in total staff cost was achieved even though there was the need for medical staff to be present 24h a day and validate all exams, while this was not the case before.

Pre-Core-Lab			Core-Lab		
	Units	Monthly cost		Units	Monthly cost
Technicians	28.5	€ 100,495.07	Technicians	22.83	€ 80,501.84
Physicians	23	€ 215,906.37	Physicians	20	€ 187,744.67
Auxiliary staff	10.3	€ 29,445.13	Auxiliary staff	10.3	€ 29,445.13
Technician coordinators	2	€ 7,052.29	Technician coordinators	1	€ 3,526.14
<b>Total</b>	<b>63.8</b>	<b>€ 352,898.86</b>	<b>Total</b>	<b>54.13</b>	<b>€ 301,217.78</b>

Table 1: Comparison of staff costs

### Total cost

Moving to the comparison of the total costs, including equipment costs, staff costs and indirect costs, we obtain what is shown in Table 2. Total costs decreased by €55048.73 which corresponds to 12.55% of the total cost of the pre-Core-Lab situation. Figure 3 shows the partition of total costs between the equipment, staff, and indirect + general components in the pre-Core-Lab and Core-Lab situation, respectively.

Pre-Core-Lab			Core-Lab		
DIRECT COSTS			DIRECT COSTS		
	Equipment	€ 14,950.00		Equipment	€ 20,450.00
	Staff	€ 352,898.86		Staff	€ 301,217.78
	<b>Total</b>	<b>€ 367,848.86</b>		<b>Total</b>	<b>€ 321,667.78</b>
INDIRECT COSTS	4.61% of direct costs	€ 16,954.05	INDIRECT COSTS	4.61% of direct costs	€ 14,825.58
GENERAL COSTS	13.95% of (direct+ indirect)	€ 53,680.01	GENERAL COSTS	13.95% of (direct+ indirect)	€ 46,940.82
<b>Total</b>		<b>€ 438,482.91</b>	<b>Total</b>		<b>€ 383,434.18</b>

Table 2: Comparison of total costs

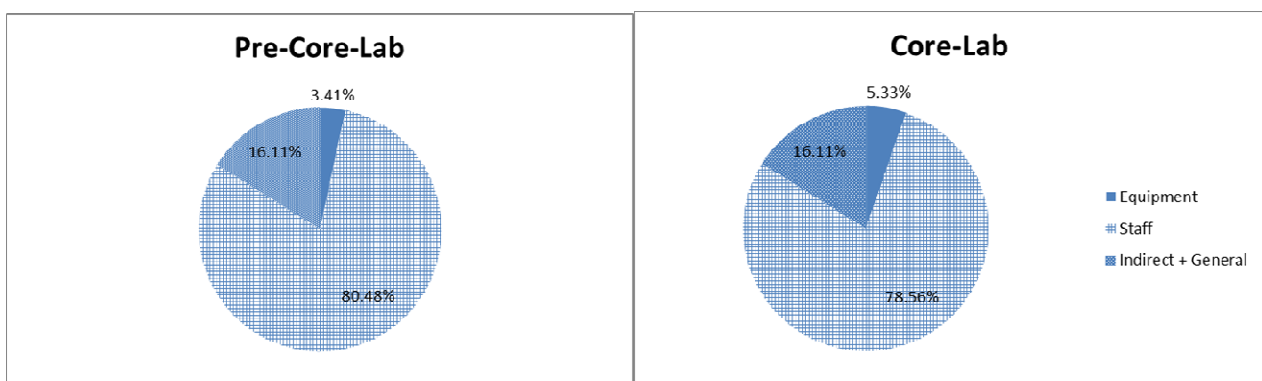


Figure 3: Total cost partition in the pre-Core-Lab and Core-Lab situation, respectively

The figure clearly shows that there has been a decrease in staff cost and an increase in equipment cost. This was expected as automation leads to an investment in new

equipment (even if reduced like in the case of Spedali Civili) which, in turn, allows to reduce the staff involved in the operational management of the laboratory.

Finally, figure 4 show a comparison, in terms of FTE per number of tests, of the pre-Core-Lab and Core-Lab situation. The figure shows that the same number of tests is now provided with a smaller amount of FTE. Moreover, the Core-Lab can be classified as a “big” laboratory, as most of the other laboratories in the figure perform a much smaller number of tests.

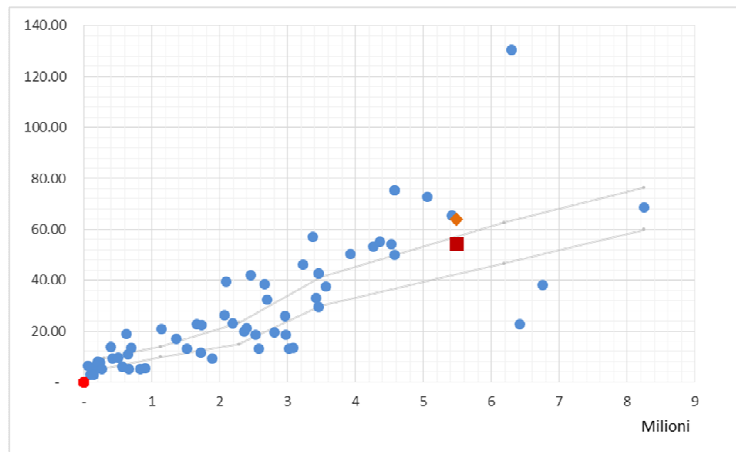


Figure 4: Comparison with other Italian laboratories in terms of FTE per volume

## Conclusions

We here presents a cost analysis related to the introduction of an automated laboratory in the Spedali Civili in Brescia, Italy. Our analysis shows that the introduction of the automated chain, which permitted to merge four pre-existing laboratories, lead to important cost savings mainly in terms of staff costs, even considering the short operative period which included all setup issues. This allows to state that the management strategy, with the goal of introducing automation while minimizing the corresponding costs, has been successfully achieved.

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